

# PATENT SPECIFICATION

## DRAWINGS ATTACHED



**867.103**

Date of Application and filing Complete Specification June 12, 1958.  
No. 18819/58.

Application made in Germany on June 13, 1957.

Complete Specification Published May 3, 1961.

Index at acceptance:—Class 144(2), C(2B6:3B12).

International Classification:—B62g.

### COMPLETE SPECIFICATION

## Pneumatic Vehicle Tyres for Employment with or without Inner Tubes

### CORRECTION OF CLERICAL ERROR

SPECIFICATION NO. 867.103

The following correction is in accordance with the Decision of the Super-Intending Examiner, acting for the Comptroller-General, dated the twenty ninth day of May, 1961.

Page 1, in the title, after "Employment" delete "with or".

THE PATENT OFFICE,  
23rd June, 1961

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conventional tyres equipped with inner tube as well as with the tubeless tyres, although the latter incorporate in comparison to the former a higher degree of safety in the case of a sudden loss of inflation pressure.

Quite a number of suggestions have become known in the past for removing or at least attenuating the afore-mentioned deficiencies that are generally still inherent in pneumatic tyres. For instance, one suggestion contemplated bonding a plastic compound to the inside of the inner tube or of the tyre for automatically closing any possible puncture of the inner tube or of the tyre so that only a limited quantity of air would be able to escape. There was also an attempt made at subdividing the inner tube or the tyre into several compartments entirely enclosed relative to each other so that in the case of damage only the quantity of air contained in the compartment directly affected by the damage would be lost. Other suggestions considered designing the body of the tyre with inherent sufficient stiffness so that it would still be usable in case of damage with ensuing total loss of air or inflation pressure, inasmuch as the total wheel

previously proposed that the abovementioned resilient body should be placed on the rim alone, without a surrounding tyre cover, and function as a cushion tyre, and that the necessary retaining means for this purpose should be provided on the resilient body.

The measures of the prior art in obtaining appropriate improvements of pneumatic vehicle tyres are more or less characterized by extraordinary increase of the weight and the cost of the tyres and yet not always absolute assurance of achievement of the desired effect by the measure employed upon occurrence of a damage to the tyre.

Many of the further characteristics in conjunction with the suggested measures, e.g., the above-cited stiffening of the body of the tyre, are, besides, accompanied by disadvantageous changes of the riding properties of the tyres in undamaged condition to such an extent that it is impossible from the onset to employ tyres of this design in the same way as normal tyres. The object of the present invention is to provide a tyre that is puncture-proof and essentially bullet-proof, at a weight exceeding the weight of conventional tyres only within

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### Pneumatic Vehicle Tyres for Employment with or without Inner Tubes

We, METZELER GUMMIWERKE A. G., a German Company, of Westendstrasse 131—133, Munich, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

A pneumatic vehicle tyre is fully usable only as long as it is maintained at the prescribed or normal inflation pressure. Any loss of inflation pressure will at least seriously endanger the life of the tyre. A total escape of the air out of the tyre—possibly all of a sudden while the vehicle is driving on the road—may easily give rise to a grave accident. These shortcomings are present with the conventional tyres equipped with inner tube as well as with the tubeless tyres, although the latter incorporate in comparison to the former a higher degree of safety in the case of a sudden loss of inflation pressure.

Quite a number of suggestions have become known in the past for removing or at least attenuating the afore-mentioned deficiencies that are generally still inherent in pneumatic tyres. For instance, one suggestion contemplated bonding a plastic compound to the inside of the inner tube or of the tyre for automatically closing any possible puncture of the inner tube or of the tyre so that only a limited quantity of air would be able to escape. There was also an attempt made at subdividing the inner tube or the tyre into several compartments entirely enclosed relative to each other so that in the case of damage only the quantity of air contained in the compartment directly affected by the damage would be lost. Other suggestions considered designing the body of the tyre with inherent sufficient stiffness so that it would still be usable in case of damage with ensuing total loss of air or inflation pressure, inasmuch as the total wheel

load would be supported by the stiffened side walls of the tyre.

It has also been previously proposed that a resilient body, shaped to conform with the hollow space formed by a tyre cover, should be loosely inserted into this hollow space; this body has a central circumferential recess provided in the centre of the cross-section of the body, and radial channel-shaped slots extend from this recess to the peripheral surface of the body. In a tyre of this kind, if the air pressure is reduced or if all of the compressed air escapes, then these slots close under the action of the pressure exerted from outside on the tyre and on the inserted body, and the tyre travels in the manner of a cushion tyre.

As a modification of this, it has also been previously proposed that the abovementioned resilient body should be placed on the rim alone, without a surrounding tyre cover, and function as a cushion tyre, and that the necessary retaining means for this purpose should be provided on the resilient body.

The measures of the prior art in obtaining appropriate improvements of pneumatic vehicle tyres are more or less characterized by extraordinary increase of the weight and the cost of the tyres and yet not always absolute assurance of achievement of the desired effect by the measure employed upon occurrence of a damage to the tyre.

Many of the further characteristics in conjunction with the suggested measures, e.g., the above-cited stiffening of the body of the tyre, are, besides, accompanied by disadvantageous changes of the riding properties of the tyres in undamaged condition to such an extent that it is impossible from the onset to employ tyres of this design in the same way as normal tyres. The object of the present invention is to provide a tyre that is puncture-proof and essentially bullet-proof, at a weight exceeding the weight of conventional tyres only within

tolerable limits, and involving no appreciable sacrifices in the riding properties or the permissible speed limit in undamaged condition, and possessing fixed parts safeguarding the running property and coming into effect only on partial or total loss of the inflation pressure of the tyre and allowing the tyre to continue running until repair can be effected.

The problem is solved according to the invention by stiffeners attached to the insides of the side walls of a tubeless tyre and extending round the circumference of the tyre and divided into co-operating parallel circumferential stiffening ribs, the yielding nature of the side walls of the normally inflated tyre being substantially maintained, and by circumferential wedge-shaped gaps between the stiffening ribs, which gaps close when the normal internal pressure of the tyre is reduced. The term "stiffeners" is to be understood to mean attached parts which in the absence of internal air pressure will give the side walls of the tyre sufficient resistance against bending to prevent the tyre from collapsing under the weight of a vehicle on which the tyre is mounted.

An embodiment of the invention chosen by way of example is illustrated in the accompanying drawings, in which:—

Figure 1 is a cross-section through a tyre in an unloaded state; and

Figure 2 is a section through the tyre mounted on a wheel rim, normally inflated and subjected to a normal load.

A respective stiffener 3 made of rubber is attached to the inside of each of the side walls 2 of the tyre 1. Circumferentially, the stiffener 3 extends continuously all the way round the side wall; radially, the stiffener extends from a point near the radially inner extremity of the tyre side wall to a point near the centre of the tread, as shown in the drawings.

The stiffener is divided into individual circumferential ribs 4 to 8 each extending round the whole circumference of the tyre and separated from one another by wedge-shaped gaps 9. The ribs adjacent to the tread taper towards the centre of the tread. The stiffeners 3 may be firmly attached, while in a plastic condition, to the inside of the side walls of the tyre 1 while these walls are also in a plastic

condition so that the stiffeners are intimately and adherently bonded with the material of the tyre. After the tyre has been cured together with the bonded stiffener 3, the stiffener is divided into single ribs 4 to 8 by producing cuts 9 round the whole circumference of the tyre by means of a suitable tool; the cuts are dimensioned so that they are nearly but not entirely closed and form only very narrow gaps when the tyre is inflated and normally loaded (Fig. 2). The tyre according to the invention obtains in this way a road-holding quantity equalling that of a conventional tyre without any bonded stiffeners. The cuts or gaps between the single ribs 4 to 8 of the stiffener 3 are closed when the tyre suffers a partial or total loss of inflation pressure, and are momentarily closed when the tyre is subjected to abnormally severe shocks originating in irregularities of the road. In the case of any loss of pressure, the total load on the tyre is continuously taken over by the side walls 2 of the tyre which have become highly resistant to bending moments owing to the closing of the gaps, so that the tyre may safely be run for some distance until a repairshop is reached or repair can be effected.

The division of the stiffeners 3 into the single ribs 4 to 8, and the attachment of the stiffeners to the side walls of the tyre, can be effected by methods and means other than those set forth above without departure from the scope of the invention as set forth in the following claims.

#### WHAT WE CLAIM IS:—

1. A tubeless vehicle tyre, in which stiffeners are attached to the insides of the side walls of the tyre and extend round the circumference of the tyre and are divided into co-operating parallel circumferential stiffening ribs, the yielding nature of the side walls of the normally inflated tyre being substantially maintained, and in which circumferential wedge-shaped gaps are provided between the ribs, which gaps close when the normal internal pressure of the tyre decreases.

2. A tubeless vehicle tyre substantially as hereinbefore described and illustrated in the accompanying drawings.

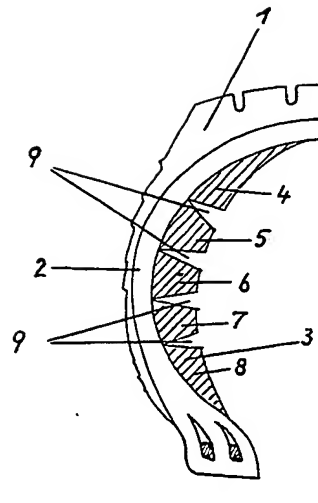
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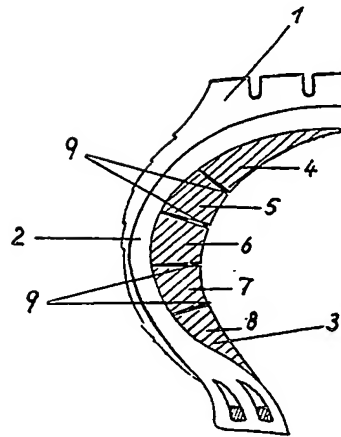
COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of  
the Original on a reduced scale*



*Fig. 1*



*Fig. 2*